PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Applicant:	Ulrich Bonne et al.	Confirmation No.: 8299
Serial No.:	10/671,930	Examiner: Keri A. Moss
Filing Date:	September 26, 2003	Group Art: 1797
For:	PHASED MICRO ANALYZER III, IIIA	
Docket No.:	H0004978-1100.1208101	

APPEAL BRIEF

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Lynn Thompson — February 18, 2008
Lynn Thompson — Date

Pursuant to 37 C.F.R. § 41.37, Appellants hereby submit this Appeal Brief in furtherance of the Notice of Appeal filed on December 17, 2007 and of the Notice of Panel Decision from Pre-Appeal Review dated January 18, 2008. Appellants authorize the fee prescribed by 37 C.F.R. § 41.20(b)(2) in the amount of $510.00 to be charged to Deposit Account No. 50-0413. Permission is hereby granted to charge or credit Deposit Account No. 50-0413 for any errors in fee calculation.

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I. REAL PARTY IN INTEREST

The real party in interest is the assignee of record, Honeywell International Inc., a corporation organized and existing under and by virtue of the laws of Delaware, and having its principal offices at 101 Columbia Road, Morristown, New Jersey 07962, USA. An assignment from the inventors, Ulrich Bonne, Tom Rezachek, and Robert Higashi, conveying all right, title and interest in the invention to Honeywell International Inc., has been recorded at Reel 015650, Frame 0401.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences.

III. STATUS OF CLAIMS

Claims 1, 2, 5, 6, 22-24, and 28-30 stand finally rejected under 35 U.S.C. §103(a) as being unpatentable over Bonne et al. (U.S. Patent No. 6,393,894). Claims 3, 4, 8-10, and 25-27 stand finally rejected under 35 U.S.C. § 103(a) as being unpatentable over Bonne et al. in view of Kubisiak et al. (U.S. Patent No. 6,169,965). Claims 11-21 and 31-42 are withdrawn as being directed to a non-elected invention. All examined claims, namely claims 1-20 and 22-30, are being appealed.

IV. STATUS OF AMENDMENTS

No amendment was filed after the Final Office Action mailed October 17, 2007.

V. SUMMARY OF CLAIMED SUBJECT MATTER[1]

The invention relates generally to fluid sensors. More specifically, the present invention relates to a phased heater array structure, and more particularly to application of the structure as a sensor for the identification and quantification of fluid components, including gases and liquids. A sensor system/analyzer is provided consisting of an array of selective, sensitive, fast

[1] The references to the specification and drawings provided herein are only illustrative and not limiting in any way.

and low-power phased heater elements in conjunction with an array of compact, fast, low-power, ambient pressure, minimal pumping spectral analysis devices to achieve fluid component presence, identification and quantification (see, for example, specification at page 3, lines 16-20).

Turning now to the claims, where independent claim 1 recites a fluid sensor comprising a concentrator and a separator connected to the concentrator (see, for example, specification at page 14, lines 15-17 and FIG. 2). The fluid sensor also comprises a phased heater array (see, for example, specification at page 14, line 19 through page 15, line 14; FIG. 3), a ratio control mechanism connected to the phased heater array (see, for example, specification at page 20, lines 9-11), and at least a first detector connected to either the concentrator or the separator (see, for example, specification at page 20, lines 12-20; FIG. 3). The sensor has a first plurality of heating elements situated in the concentrator and a second plurality of heating elements situated in the separator, where the concentrator heating elements and separator heating elements are in a pre-arranged pattern (see, for example, specification at page 19, line 18 through page 20, line 11; FIG. 5, reference numbers 40, 42, 44, 46, 140, 142, 144, 146). The ratio control mechanism changes the ratio of concentrator heating elements relative to separator heating elements (see, for example, specification at page 20, lines 9-11).

Independent claim 22 recites a fluid sensor comprising a concentrator (see, for example, specification at page 14, lines 15-17; FIG. 2, reference number 124) having a first plurality of heater elements (see, for example, specification at page 19, lines 18-22), a separator (see, for example, specification at page 14, lines 15-17; FIG. 2, reference number 126) having a second plurality of heater elements corresponding to the number of concentrator heater elements (see, for example, page 15, line 22 through page 16, line 7; FIG. 5), a controller connected to the concentrator and separator, and a detector connected to either the concentrator or separator. A ratio of the concentrator heater elements to the separator heater elements may be changed via the controller (see, for example, specification at page 20, lines 9-24).

VI. GROUND OF REJECTION TO BE REVIEWED ON APPEAL

1. Whether claims 1, 2, 5, 6, 22-24, and 28-30 are unpatentable under 35 U.S.C. § 103(a) over Bonne et al. (U.S. Patent No. 6,393,894).

2. Whether claims 3, 4, 8-10, and 25-27 are unpatentable under 35 U.S.C. § 103(a) over Bonne et al. (U.S. Patent No. 6,393,894) in view of Kubisiak et al. (U.S. Patent No. 6,169,965).

VII. ARGUMENT

A. Claims 1, 2, 5, 6, 22-24, and 28-30 are patentable under 35 U.S.C. § 103(a) over Bonne et al. (U.S. Patent No. 6,393,894).

i. *Independent claim 1*

Claim 1 is rejected as being obvious over Bonne et al. The Examiner asserts that Bonne teaches the invention substantially as claimed except for a plurality of heater elements in the separator. The Examiner acknowledges that Bonne teach a single heating element in the separator, but asserts that mere duplication of parts has no patentable significance unless a new and unexpected result is produced. Applicants respectfully traverse the rejection.

Independent claim 1 recites, in part:

> a phased heater array having a first plurality of heating elements situated in the concentrator and a second plurality of heating elements situated in the separator, wherein the concentrator heating elements and separator heating elements are in a pre-arranged pattern;

Emphasis added. Bonne does not appear to teach such a structure. Further, because Bonne teaches a single heating element in the separator, there is no motivation or suggestion for not only adding additional heating elements to the separator, but for putting such additional heating elements in a pre-arranged pattern with the concentrator heating elements, as claimed.

In the final Office Action mailed October 17, 2007, the Examiner makes various assertions that are unsupported by any reference or articulated reasoning with rational underpinning. The Examiner asserts that while Bonne does not expressly teach a fluid sensor

comprising a plurality of concentrator heater elements corresponding to a plurality of separator heater elements, the number of heater elements used by one of ordinary skill in the art is a result-effective variable.

The Examiner acknowledges that Bonne teach a single heating element in the separator, but asserts that mere duplication of parts has no patentable significance unless a new and unexpected result is produced. Appellants submit that mere duplication of the parts of Bonne does not result in the claimed sensor. Independent claim 1 recites, "a ratio control mechanism for changing the ratio of concentrator heating elements relative to separator heating elements". Bonne lack not only the claimed plurality of heating elements in the separator, but also lack the claimed ratio control mechanism. Thus, the Examiner's assertion that Bonne differs from the claimed sensor merely by the number of heating elements in the separator is incorrect. Further, because Bonne teaches a single heating element in the separator, there is no motivation or suggestion for not only adding additional heating elements to the separator, but for putting such additional heating elements in a pre-arranged pattern with the concentrator heating elements, and adding a ratio control mechanism, as claimed.

The structure of the claimed fluid sensor thus differs from Bonne in at least three ways: (1) the claimed sensor has a plurality of heating elements situated in the separator while Bonne appears to teach a single heater in the separator; (2) the claimed sensor has the plurality of concentrator heating elements and the plurality of separator heating elements in a pre-arranged pattern, while Bonne do not appear to teach this structure because only a single separator is taught; and (3) the claimed sensor has a ratio control mechanism while Bonne does not appear to teach this structure. Appellants submit that the Examiner's assertion that merely duplicating the separator heating element in Bonne would have been obvious and would achieve the claimed structure is invalid. Such a modification of Bonne would appear to achieve, at best, a sensor with a plurality of separator heating elements. However, such a sensor would still lack the pre-arranged pattern of concentrator to separator heating elements and would also lack the claimed ratio control mechanism.

Additionally, the plurality of heating elements in the claimed separator is not a mere

duplicate. The presence of the plurality of separator heating elements in combination with the plurality of concentrator heating elements and the ratio control mechanism provides versatility to the fluid sensor by allowing the ratio of concentrator heating elements relative to separator heating elements to be changed. Changing the ratio allows different concentrator and different separator heating elements to be utilized, which allows different groups of gases to be separated and detected. For example, see the specification at page 19, line 18 through page 20, line 12. Further, Applicants submit that there is no motivation for one of ordinary skill in the art to modify the sensor of Boone by adding separator heating elements and a ratio control mechanism. The only motivation for making such a change appears to be found in Applicants' specification, which is improper. Additionally, even if one were to duplicate the single separator heating element of Boone, one would not arrive at the claimed fluid sensor because Boone also fails to teach concentrator and separator heating elements in a pre-arranged pattern, or a number of separator heater elements corresponding to the number of concentrator heater elements, or a ratio control mechanism as indicated above.

The Examiner further cites *In re Boesch* as teaching that optimization of a result-effective variable is ordinarily within the skill of one in the art. The Examiner asserts that it would have been obvious to vary the number of either separator or concentrator heater elements to obtain the desired concentration of the desired compound. MPEP 2144.05 II. B. states:

> B. Only Result-Effective Variables Can Be Optimized
>
> A particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation. *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977) (The claimed wastewater treatment device had a tank volume to contractor area of 0.12 gal./sq. ft. The prior art did not recognize that treatment capacity is a function of the tank volume to contractor ratio, and therefore the parameter optimized was not recognized in the art to be a result- effective variable.). See also *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980) (prior art suggested proportional balancing to achieve desired results in the formation of an alloy).

Emphasis added. The Examiner has provided no reasoning or arguments that the prior art

recognizes the number of either separator or concentrator heater elements is a result-effective variable. Appellants submit that the prior art does not recognize the number of heater elements is a result-effective variable, therefore any optimization is not a result-effective variable and not within the skill of one of ordinary skill in the art.

Regarding the claimed ratio control mechanism, Bonne appears to teach a sensor assembly control block 180 that controls the timing of the plurality of heating elements in the concentrator and the single heater in the separator. See column 7, line 36 through column 8, line 37. While the controller 180 of Bonne appears to control the timing of the heating elements in the concentrator, there is no motivation for one of ordinary skill in the art to modify the controller to control a ratio of a plurality of concentrator and separator heating elements in a pre-arranged pattern. The Examiner appears to be asserting that it would have been obvious for one of ordinary skill in the art to not only add heating elements to Bonne, but also arrange them in a pattern with the concentrator heating elements and further add a ratio control mechanism that changes the ratio of concentrator heating elements relative to separator heating elements. The Examiner asserts that such modifications would have been obvious to obtain the desired concentration of the desired compound. Appellants respectfully disagree. The Supreme Court in *KSR Int'l Co. v. Teleflex Inc.* quotes *In re Kahn*, 441 F. 3d 977, 988 (CA Fed. 2006):

> "[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness".

Emphasis added; see page 14 of the April 30, 2007 decision. The Court further stated:

> a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.

See page 14 of the April 30, 2007 decision. Appellants submit that the Examiner's conclusion of obviousness lacks the necessary articulated reasoning with rational underpinning. Further, the Examiner's assertion that merely varying the number of separator or concentrator heater elements is well-known and achieves the claimed sensor is in error. Merely adding additional

heater elements to the sensor of Bonne does not appear to result in the claimed sensor. In addition to added heater elements in the separator, claim 1 is distinguished from Bonne in that the claimed sensor has the concentrator and separator heating elements in a pre-arranged pattern, and the sensor includes a ratio control mechanism for changing the ratio of concentrator heating elements relative to separator heating elements. Bonne do not appear to teach a ratio control mechanism and the Examiner has provided no reasoning for why one of ordinary skill in the art would have been motivated to add such a mechanism to the sensor of Bonne. Thus, the Examiner's assertion that adding a sensor heating element to Bonne achieves the claimed sensor is in error and is not supported by articulated reasoning with rational underpinning. Appellants submit that for at least the reasons set forth above, the invention of independent claim 1, and the claims dependent thereon, are patentable over Bonne.

ii. *Independent claim 22*

Independent claim 22, as amended, recites, in part:

> a concentrator having a first plurality of heater elements;
> a separator having a second plurality of heater elements corresponding to the number of concentrator heater elements;

Emphasis added. Bonne does not appear to teach such a structure. As discussed above, Bonne appears to teach a single heating element in the separator. Further, Bonne does not provide any suggestion or motivation for one of ordinary skill in the art to add additional separator heating elements, and in particular, Bonne does not provide any suggestion or motivation or to add separator heating elements in numbers corresponding to the number of concentrator heater elements, as is claimed. The Examiner asserts that it would have been obvious to achieve the number of heating elements recited in claim 22 by modifying Bonne and selecting the number of concentrator and separator heating elements in order to obtain the desired concentration of the desired compound. Such a modification would appear to be contradictory to the teachings of Bonne. Bonne teach a sensor having a single separator heating element, however, Bonne teach such a structure as providing the desired separation and detection of each constituent of the

sample. See column 9, lines 5-11. Bonne thus already teach a structure that provides a means of achieving improved concentration of the sample constituents, resulting in improved detection. The Examiner further asserts that "it would have been obvious to have a corresponding number of separator and concentrator heater elements when the corresponding number obtained the desired concentration of the desired compound." See final Office Action at page 4, last sentence. It appears the Examiner may have misunderstood the Bonne reference. The Examiner appears to be asserting that it would have been obvious to modify Bonne in order to achieve a particular desired concentration of a desired compound. Appellants submit that this does not appear to be the objective and function of the Bonne device. Rather, Bonne teach their device as producing "a multiplication effect that can significantly increase the concentration of the gas constituents at the detector, thereby increasing the effective sensitivity of the detector." See column 1, lines 54-57. Bonne thus appears to teach a sensor for concentrating gas constituents in order to detect the constituents, but does not appear to achieve any particular concentration. Because Bonne teaches using a plurality of concentrator heating elements but a single separator heating element in order to achieve the desired detection, there is no support for the Examiner's assertion that one would have modified Bonne to have a corresponding number of concentrator and separator heating elements to achieve the desired concentration. Bonne appears to teach away from such a modification.

Additionally, Bonne appears to teach a sensor assembly control block 180 that controls the timing of the plurality of heating elements in the concentrator and the single heater in the separator. See column 7, line 36 through column 8, line 37. While the controller 180 of Bonne appears to control the timing of the heating elements in the concentrator, there is no motivation for one of ordinary skill in the art to modify the controller to control a ratio of a plurality of concentrator and separator heating elements in a pre-arranged pattern.

The Examiner also asserts that Boone teaches a micro discharge mechanism located proximate to the first detector, pointing to the outlet below part 264 in Figure 9, and column 4, lines 14-19. Applicants respectfully traverse the rejection. Boone appears to teach a single detector 264 in figure 9. The Examiner asserts that the unlabeled "outlet" is a micro discharge

mechanism because it is microscopic in size and actively discharges the fluid from the chip. The Examiner merely points to a teaching of a microbridge system for support. MPEP 2143.03 recites:

> To establish prima facie obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970).

Boone does not appear to teach or suggest the micro discharge mechanism proximate the first detector, as is recited in claim 2.

The Examiner acknowledges that Boone does not teach a plurality of heater elements in the separator, but asserts that the mere duplication of parts has not patentable significance unless a new and unexpected result is produced. The Examiner then asserts that the single separation heater separates the constituent gasses into individual components, and the use of a plurality of separation heater elements would be expected to provide a more precise separation of components, which would have been obvious to one of ordinary skill in the art.

Applicants respectfully disagree. As discussed above, the plurality of heating elements in the separator is not a mere duplicate. The presence of the plurality of separator heating elements in combination with the plurality of concentrator heating elements and the ratio control mechanism provides versatility to the fluid sensor by allowing the ratio of concentrator heating elements relative to separator heating elements to be changed. Changing the ratio allows different concentrator and different separator heating elements to be utilized, which allows different groups of gases to be separated and detected. For example, see the specification at page 19, line 18 through page 20, line 12. Further, Applicants submit that there is no motivation for one of ordinary skill in the art to modify the sensor of Boone by adding separator heating elements and a ratio control mechanism. The only motivation for making such a change appears to be found in Applicants' specification, which is improper.

Additionally, even if one were to duplicate the single separator heating element of Boone, one would not arrive at the claimed fluid sensor because Boone also fails to teach concentrator

and separator heating elements in a pre-arranged pattern, or a number of separator heater elements corresponding to the number of concentrator heater elements, or a ratio control mechanism as indicated above. Appellants submit that for at least the reasons set forth above, the invention of independent claim 22, and the claims dependent thereon, are patentable over Bonne. Reconsideration and withdrawal of the rejection is respectfully requested.

B. Claims 3, 4, 8-10, and 25-27 are patentable under 35 U.S.C. § 103(a) over Bonne et al. (U.S. Patent No. 6,393,894) in view of Kubisiak et al. (U.S. Patent No. 6,169,965)..

i. *Claims 3, 4, 8-10, and 25-27*

Claims 3, 4, 8-10, and 25-27 are rejected as being unpatentable over Bonne et al. in view of Kubisiak et al. The Examiner acknowledges that Bonne fails to teach a second detector or a flow sensor, or a processor on a separate board from the concentrator, separator and phased heater array. Kubisiak is cited for teaching a detector and flow sensor connected to a processor comprising switches and control logic, where the detector is used to measure fluid properties. The Examiner asserts that it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device of Bonne with the processor and switches of Kubisiak in order to control the timing of the activation of the different heating elements and to gain the additional advantage of determining the phase lag and fluid properties. Applicants respectfully traverse the rejection.

For at least the reasons set forth above, Bonne does not appear to teach the basic elements of independent claims 1 and 22, from which claims 3-10 and 25-29 depend. Kubisiak does not appear to provide what Bonne lacks, thus any combination of Bonne and Kubisiak also fails to teach each and every element of the claims. Further, even if one were to combine the teachings of Bonne and Kubisiak, one would not arrive at the claimed invention. None of the references appear to teach or suggest a fluid sensor having a first plurality of heating elements in a concentrator and a second plurality of heating elements in a separator, or a ratio control mechanism as claimed. Reconsideration and withdrawal of the rejection are respectfully requested.

C. Conclusion.

For the reasons stated above, the rejections of claims 1-10 and 22-30 under 35 U.S.C. § 103(a), should both be reversed.

Respectfully Submitted,

Dated: 02-18-08

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VIII. CLAIMS APPENDIX

1. A fluid sensor comprising:

   a concentrator;

   a separator connected to the concentrator;

   a phased heater array having a first plurality of heating elements situated in the concentrator and a second plurality of heating elements situated in the separator, wherein the concentrator heating elements and separator heating elements are in a pre-arranged pattern;

   a ratio control mechanism for changing the ratio of concentrator heating elements relative to separator heating elements, the ratio control mechanism connected to the phased heater array; and

   at least a first detector connected to either the concentrator or the separator.

2. The sensor of claim 1, wherein the first detector is connected to the separator; the fluid sensor further comprising a micro discharge mechanism proximate to the first detector.

3. The sensor of claim 2, further comprising a second detector connected to the concentrator.

4. The sensor of claim 3, further comprising a flow sensor connected to the concentrator and the separator.

5. The sensor of claim 4, further comprising a processor connected to the detectors, concentrator, flow sensor, separator and micro discharge mechanism.

6. The sensor of claim 5, wherein the processor comprises switches and control logic.

7. The sensor of claim 6, wherein the switches and control logic are situated on a first board.

8. The sensor of claim 7, wherein the concentrator, separator and phased heater array are situated on a second board.

9. The sensor of claim 8, wherein the first board and second board are connected to each other.

10. The sensor of claim 9, wherein the first board and the second board are connected via solder bumps and/or wire-bonds.

11. A fluid sensor comprising:
a phased heater structure; and
at least one discharge device proximate to the phased heater structure.

12. The sensor of claim 11, further comprising a processor connected to the phased heater structure.

13. The sensor of claim 12, wherein:
the phased heater structure comprises a concentrator and a separator;
the concentrator has a first plurality of heaters of the phased heater structure;
the separator has a second plurality of heaters of the phased heater structure; and
a ratio of the first plurality of heaters relative to the second plurality of heaters may be varied.

14. The sensor of claim 13, wherein the concentrator may be a pre-concentrator.

15. The sensor of claim 12, further comprising switches and logic components connected to the phased heater structure.

16. The sensor of claim 15, wherein:
the phased heater structure is situated on a first chip;
the switches and logic components are situated on a second chip; and
the first and second chips are connected to each other.

17. The sensor of claim 16, wherein the first and second chips are connected via wire-bonds.

18. The sensor of claim 16, wherein the first and second chips are connected via solder-bumps.

19. A fluid sensor comprising:
a phased heater structure proximate on a first chip;
a plurality of switches and/or logic components on a second chip; and
the first chip and second chip are connected.

20. The sensor of claim 19, wherein the first and second chips are connected via solder-bumps.

22. A fluid sensor comprising:
a concentrator having a first plurality of heater elements;
a separator having a second plurality of heater elements corresponding to the number of concentrator heater elements;
a controller connected to the concentrator and separator; and
a detector connected to either the concentrator or separator; and

wherein a ratio of the concentrator heater elements to the separator heater elements may be changed via the controller.

23. The sensor of claim 22, wherein the concentrator may be a pre-concentrator.

24. The sensor of claim 23, further comprising at least one discharge device proximate to the separator and connected to the controller.

25. The sensor of claim 23, wherein:
the concentrator and separator are on a first chip; and
the controller is on a second chip connected to the first chip.

26. The sensor of claim 25, wherein the first and second chips are connected via wire-bonds.

27. The sensor of claim 25, wherein the first and second chips are connected via solder-bumps.

28. The sensor of claim 24, further comprising at least one thermal-conductivity detector connected to the controller.

29. The sensor of claim 28, further comprising at least one flow sensor connected to the controller.

30. The sensor of claim 24, wherein the heater elements apply heat in a sequential phased manner to the concentrator.

IX. EVIDENCE APPENDIX

No additional evidence has been presented.

X. RELATED PROCEEDINGS APPENDIX

There are no related appeals or interferences.